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Fact Sheet

Range Management How Plants Grow

United States
Department of
Agricultural

Soil
Conservation
Service

Bozeman, MT

What?

A basic problem facing a livestock producer is how close can plants be safely grazed or mowed and still obtain maximum productivity over an extended period. The problem is compounded by varying climatic conditions, growth habits of different plants, and livestock preferences from different plants. The time of year and age of the plant when grazing or mowing occurs also affects plant growth.

The Leaf Growth Miracle

Plants manufacture food in the leaves through the use of solar energy.

Yet some people wrongfully assume plants produce food in their roots. True, plants pull water and minerals from the soil, but the food factory is located above the ground in the leaves and green stems.

Minerals from the soil make up only about 5 percent of the solid material in plant roots, stems, and leaves. Carbon, hydrogen, and oxygen from the air and water make up most of the other 95 percent.

The leaves take in carbon dioxide gas from the air through tiny pores. Using solar energy, the leaves recombine the carbon with oxygen and hydrogen to make sugars and starches. The sugars then mix with minerals from soil to make fibers, proteins, plant oils, and fats. The plant uses these sugars, starches, proteins, oils, and fats to grow and reproduce.

The ability of perennial grasses, legumes, and forbs to recover quickly after grazing or mowing makes these plants extremely valuable for forage production and damage the plant's root system. The plant will eventually die if overharvest of the leaves continues.

Leaf Removal and Growth

Root growth is closely related to forage production. Plants maintain their maximum root vigor and growth when no more than half their leaves are removed by grazing or mowing during the growing season. If the plant's food producing mechanism is deprived, leaf and root growth are reduced accordingly.

In all grasses, the amount of leaf volume removed has a direct affect on the growth of new roots. Roots are the vital supply lines of moisture and minerals to the leaves. Perennial grass plants store food in the roots after seasonal growth. They use these reserves to live on while dormant, to make the first new growth the next spring, and to start new growth after green leaves and stems are closely grazed at any time during the growing season.

A grass plant produces twice the volume of leaves that it needs to complete its growth and remain productive. Generally, when animals graze no more than 50 percent of the plant's current years growth, root growth continues unimpaired. When 60 to 90 percent of the plant is removed, from 50 to 100 percent of the root growth is stopped.

Other Growth Factors

Other factors influence plant growth. Proper or light grazing is usually more beneficial to plants than several years of no grazing. Heavy plant residue depresses growth of many grasses.

Growing Points

All plants have growing points where new cells are developed. The growing points of a grass are located just above the last completed joints of each stem. Early in the season, the growing points are situated at the base of the plant. As the season progresses, the joints of most species elongate and push upward to produce a seed stalk. At this time, the growing point is elevated and in a vulnerable position. Removal of the point by grazing or mowing forces the plant to send up new leaves from the base of the plant and to start over as if it were spring. This causes additional drain on root reserves and can weaken the plant.

The growing points of trees, shrubs, and forbs are located on the outer tips of branches.

Reproduction

Grazing management schemes can be used to favor the more desirable plants during their reproductive period.

Seed. All annuals, and many perennials, reproduce primarily from seed. Warm-season plants usually produce seed during late summer or fall. Cool-season plants produce seed near the end of their maximum growth period, in midsummer.

Stolons. Some plants reproduce by stolons, which are prostrate stems, or above ground runners. The stolons grow on the surface of the soil, occasionally tagging down roots at the joints to secure the stolon and to begin a new plant. Buffalograss is an example.

Rhizomes. Several grasses reproduce by rhizomes, which are underground stems.

Where To Get Help

For more information on range management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service.

March 1987

Fact Sheet

Range Management Livestock Distribution

United States
Department of
Agriculture

Soil
Conservation
Service

Bozeman, MT

What?

One of the prime objectives of a range management program is to distribute livestock to obtain uniform grazing. Livestock prefer to graze areas that are more accessible and close to water. Allowing cattle to graze in this way will result in portions lightly grazed.

Why?

Good grazing distribution means more of the available forage plants in a pasture are grazed, and overgrazing of the easily accessible plants is reduced. This results in a larger amount of range receiving proper grazing, and this may reduce the amount of supplemental feeding that is necessary. A rancher must look at each grazing unit to insure that the animals are grazing most of the plants.

Distribution

Several factors influence the way livestock graze an area. These include:

Water location. Generally cattle drink water at least once a day and more often during higher temperatures. The location of water supplies within a pasture has a significant effect on grazing patterns.

Natural barriers. Cliff faces, deep gullies, and rock outcrops influence the movement of livestock as would a fence. Animals have trouble walking and grazing on steeper slopes and will avoid them.

Prevailing wind direction. Animals do not like to graze into a strong wind. Therefore, prevailing wind direction and intensity have an effect on grazing distribution.

Shaded or protected areas. Animals seek shelter from the cold or heat and from high winds. Areas of a pasture that provide shelter with plant cover or the topography are used more during periods of temperature extremes or when the wind is high.

Exposure. West- and south-facing slopes are warmer and may be used more on cooler days or in the winter. East- and north-facing slopes are cooler and may be used more on warmer days.

Season of use. Some areas of a pasture are attractive to livestock because of the vegetation growing there. Animals seek the most palatable plants growing at the time. For example, they are attracted to cool-season growing plants during the spring and early summer. The location of the different plants within a pasture and the time of year often has an influence on the grazing pattern.

Methods to Control Distribution

After the livestock distribution in a pasture is analyzed there are several methods to consider when attempting to change the animals' grazing habits.

Grazing systems. "Planned Grazing Systems" are discussed in another Fact Sheet. However, remember that every grazing system has an effect on livestock distribution. Concentrating livestock into large herds and rotating the herds through two or more pastures tends to improve grazing distribution for each pasture.

Water development. In large pastures where areas are too far from water, the development of a new water supply may improve distribution.

Fencing. With the development of lower-cost fencing, adding fences to control animal movement is now more practical. Small pastures improve distribution. Separating rugged terrain and gentle terrain will improve use on the steeper pastures.

Trails. Where natural barriers occur, the construction of trails or driftways can open up new areas of pasture grazing.

Salt or feed location. Moving the location of salt or feed bunks may cause animals to increase grazing on lightly used areas of a pasture.

Animal herding. Drifting or herding animals from heavily used to lightly used pasture will redistribute the grazing pressure.

Brush management. When planning the management of large shrubs, leave clusters of them to provide necessary shelter. By locating these in predetermined areas, they will draw the stock during periods when shelter is needed and encourage grazing in nearby open areas. However, livestock will often avoid areas with thick brush and will forage in open prairie areas. Therefore, plan and evaluate the effects of brushy areas on livestock distribution.

Other practices. Waterspreading and fertilizing may also promote livestock distribution. Analyze any range practice before you apply it to insure that it will produce a positive effect on grazing and will result in more plant and animal production.

Where to Get Help

For more information on range management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service.

March 1987

Fact Sheet

Range Management Erosion Causes and Control

United States
Department of
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Bozeman, MT

Why Be Concerned About Erosion

Erosion control is needed in any range management plan to reduce soil and water losses allowing these resources to produce high quality forage. The better your range management program, the better your erosion control will be.

What Causes Erosion

Some erosion occurs naturally. However, a man can accelerate erosion. For example, poor grazing management is a major cause of erosion. Off-road travel, trails rutted into the sod and poor control of drainage water from roads can also increase erosion.

A raindrop that hits bare soil has a different effect from one that falls on a plant or litter. Water erosion occurs when a raindrop strikes the bare soil, dislodging some soil particles and packing the surface soil together. When the soil surface is sealed, less water goes into the soil and runoff occurs. On the other hand, when a raindrop hits a plant, or litter, its force is broken and it trickles into the soil. Grasses and litter are most effective in catching and holding moisture on the range.

Wind erosion occurs on rangeland when there isn't enough plant cover. The greater distance between plants, the more chance for wind to pick up soil particles.

The amount of plant cover on the soil surface at the time of a rain or wind storm is the primary factor in preventing erosion. Both the bulk, or total weight, of cover and the distribution over the surface are important to reduce erosion. Long-term improvement of plant cover will occur only through proper management.

How to Control Erosion

The primary treatment for erosion on rangeland is to increase plant cover and litter. The first criteria is proper grazing management that provides for growth and maintenance of healthy plants. The plants and litter form a protective cover that breaks the impact of raindrops and promotes favorable surface conditions for water intake.

Other practices to control erosion on rangelands include brush management, grazing systems, reseeding and mechanical land treatments.

The combinations of practices used for erosion control will gradually result in more and better grass production, improved condition of the range, and increased water supply for livestock and personal satisfaction in managing a resource.

For More Information

For more information on range management, contact the local office of the U. S. Department of Agriculture's Soil Conservation Service.

March 1987

Fact Sheet

Range Management Planned Grazing Systems

United States
Department of
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Soil
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Service

Bozeman, MT

What?

A planned grazing system means regulating when and how long grazing occurs in a planned sequence.

Why?

Livestock are selective in the plants they graze. They repeatedly graze the desirable plant and leave the less desired plants. This weakens the more desirable plants and allows unwanted plants to thrive and multiply. Nearly all rangeland pastures also have areas where livestock concentrate such as around water, bedding grounds, and feed grounds. Under continuous use, these areas are always overgrazed.

Grazing and resting plants on rangeland in a planned sequence gives the better plants a chance to regrow, compete, and multiply, thus gradually increasing the amount of desirable plants available per acre.

This improved range condition increases forage production, improves the habitat for wildlife, reduces erosion, and conserves water. By resting pastures, you also allow overgrazed areas to become more productive.

Kinds of Systems

Planned grazing systems vary somewhat from unit to unit. Usually in a system, livestock from several pastures are combined into one herd and allowed to graze one pasture at a time. This tends to disperse the animals and improve the grazing distribution. The design of the system varies because of the kind of livestock, available water, terrain and mixture of range sites, and the objectives of the operator. Listed are some of the basic systems.

Two-pasture, one herd. With this system, a herd of livestock is rotated between two grazing units. Each year, the units are rested during a different part of the growing season; this benefits the entire plant community. This system takes advantage of the varying growth periods of the more important plants.

Three- and four-pasture, one herd. These systems are similar to the one above except the herd is moved through more grazing units. Grazing and rest periods vary with three- and four-pasture systems, depending on the producer's objective and the time of the year. The length of each grazing period may be as short as 30 days or as long as 120 days. With some three-pasture systems, livestock are moved every three months; with some four-pasture systems, they are moved every four months. In some cases, livestock are rotated through each unit two or more times during the year.

High intensity, low frequency. With this technique, one herd of livestock normally graze eight or more grazing units in a planned sequence. Livestock are moved into one unit and the others are left to rest. When the forage is grazed to the desired intensity, livestock are moved to the next unit. Livestock typically stay in a unit until proper use is reached, about 10 to 25 days. The slow moves allow long rest periods. This system provides excellent rangeland improvement, but individual livestock performance may decline.

Short duration grazing system. This is similar to the high intensity, low frequency system except the speed of the rotation is adjusted according to the growth rate of the plants. During the peak of the growing season, livestock are moved rapidly with slower moves during the remainder of the year. A grazing cycle is completed about every 30 to 90 days. Within a year, a unit is usually grazed 30 to 40 days and rested about 330 days. When the system is operated properly, good livestock performance and good rangeland improvement can be achieved.

Cell grazing system. This system is also a short duration grazing system, but usually with 12 or more pastures in a cell. In cell grazing, the same basic principles of short duration grazing are used. It often uses a design of radiating fences to facilitate the movement of livestock. In these cases, a water supply is normally located in the center of the cell and fences radiate out from the center forming pastures. Where livestock come to the center daily for water and minerals, they can easily be moved between pastures by opening and closing gates. Producers using cell grazing generally have electric fences to reduce fencing expense.

The kind of system, or systems, may depend on present fencing and grazing unit layout, available water supplies, and economics as well as range condition, kinds and classes of livestock, long-range goals for rangeland improvement, and the time necessary to supervise operation. The point is, rangeland greatly benefits from the graze-rest sequence provided through properly managed planned grazing system.

Where To Get Help

For more information on range management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service.

March 1987

Fact Sheet

Range Management How SCS Can Help

United States
Department of
Agriculture

Soil
Conservation
Service

Bozeman, MT

What Is It?

If you own or manage rangeland, SCS range conservationists or wildlife biologists can help you maintain and improve your complex resource. Rangeland is land on which the potential native vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing by livestock or wildlife.

How?

The first step is for you and the conservationist to discuss and observe, on the land, some factors that affect range management. These include:

1. Identifying major plants that grow on your ranch.
2. Discussing how these plants produce food and how they respond to leaf removal by grazing or browsing.
3. Observing plants that are grazed and ungrazed to understand the relative palatability of each species.
4. Observing range sites (different kinds of rangeland) and the ability of each to support different kinds of plant communities.
5. Evaluating range condition on the ranch. Range condition is the comparison of the present plant community with the community that was on the site originally. This comparison is expressed as:

EXCELLENT CONDITION - Rangeland that has 76 percent or more of the original plant species present.

GOOD CONDITION - Rangeland that has 51-75 percent of the original plant species present.

FAIR CONDITION - Rangeland that has 26-50 percent of the original plant species present.

POOR CONDITION - Rangeland that has 25 percent or less of the original plant species present.

6. Determining range trend on the unit, which is an indication of whether range condition is improving or deteriorating. This can be determined by observing plant vigor, the abundance of seedlings or young plants, plant residue, composition changes, and condition of the soil surface.
7. Discussing the production potential of each range site in each kind of range condition.
8. Identifying major wildlife species that are on the ranch, then discussing habitat requirements, and determining the condition of existing habitat.

Range Inventory

After these factors have been observed and discussed, the conservationist can help inventory your rangeland resources, including:

1. Range sites, which can be recorded on an aerial photograph
2. Range condition by range sites
3. Range trend
4. Grazing patterns
5. Fences
6. Forage inventory and production potential of each pasture
7. Wildlife habitat
8. Location and amount of available water
9. Location of salting and feeding areas
10. Location of corrals
11. Other physical features and resources

Alternative Treatments

As the resource data is collected, range management problems and opportunities usually become obvious. When they have been identified, the conservationists can help you consider treatment alternatives in developing a range management plan to meet your objectives. These alternatives might include proper grazing use of key plants, short growing season deferments on some pastures, or a planned grazing system. Also, brush management, range seeding, cross fences, additional water development, better livestock distribution, and wildlife habitat improvement may be planned. You may want to consider recreation potential. All of these alternatives can be evaluated as to their cost effectiveness in meeting your goals.

Range Management Plan

As you develop your range management plan, conservationists can help you record your decisions which may include:

1. A plan map, or aerial photograph, showing permanent features, range sites, and condition classes.
2. A list and schedule of your planned treatments.
3. Information used in determining your range condition.
4. A forage inventory as well as an annual grazing plan to guide manipulation of livestock and vegetation.
5. Brush management overlays used in planning wildlife habitat improvement.

Follow-up

After you develop the plan and put it into action, the role of the conservationist is to assist you with needed follow up that might include:

1. Technical information needed to apply conservation practices.
2. Continued evaluation to ensure success of applied practices.
3. Helping to keep you informed of new techniques in rangeland and wildlife management.
4. Helping you watch for needed changes in the range management plan as it is applied.

But YOU make all decisions. The SCS role is to help you understand your rangeland and to provide the needed technical assistance to help you carry out your decisions.

Where To Get Help

For more information on range management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service. SCS personnel give technical assistance to landowners and operators through local conservation districts.

Fact Sheet

Range Management Proper Grazing Use

United States
Department of
Agriculture

Soil
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Bozeman, MT

What?

Proper grazing use means grazing at an intensity that will maintain or improve the quantity and quality of plants and protect the soil.

In general, proper grazing use is removing no more than 50 percent of the annual growth by the end of the grazing season. If the plants are grazed only during the dormant season, or if they are grazed using an intensified short duration grazing system, more of the annual growth can be removed. Under these conditions, the key species on the site may be grazed to use 65 percent by weight of the growth by the end of the grazing season. These are guidelines. Evaluation of range trend is important to insure that the plants are responding properly.

What it Does

Proper grazing use will:

1. Increase the vigor and reproduction of the more desirable plants.
2. Improve, or at least maintain, the condition of the range in general.
3. Increase forage production.
4. Improve plant cover and plant litter necessary to prevent erosion and to provide for water conservation and water quality.

Why?

With proper grazing use, the more important range plants have sufficient leaf growth to maintain plant vigor and reproduce. Proper grazing use should provide enough plant cover on the land throughout the year to protect it from erosion. The maximum amount of leaf growth that can be removed and still meet the above objectives varies according to season of use and climate.

Things to Consider

Growing points. All plants have growing points where new cells are developed. The growing points on grass are above the last completed joints of each stem. When these growing points push upward to produce a seed stalk, they are vulnerable. If the point is grazed at this time, the plants send up new leaves from the base of the plant and start over as if it were spring. This causes additional drain on root reserves and can weaken the plant.

The growing points of trees, shrubs, and forbs — are located on the outer tips of branches.

Season. The time of year affects how much leaf removal a plant can tolerate and not be overgrazed. Removing two inches in the spring would have more effect on a plant than removing several inches during the dormant season.

Deferment. Plants that are rested or deferred from grazing during the growing season are usually more vigorous. They can withstand a higher percent of leaf removal than plants that are not rested. However, excessive harvest is undesirable to all forage plants.

Wildlife use. If you are concerned about game birds and big game animals, proper grazing use must also consider wildlife food — especially browse plants such as trees, shrubs, and forbs. Because these plants grow from the outer tips of branches, proper grazing use is based on removal of available twigs and leaves.

For browse plants, proper grazing use is removing no more than 50 to 60 percent by weight of the available twigs and leaves during the growing season, or no more than 65 percent during the dormant season.

For More Information

You need to know the kinds of plants on your ranch, their value, and their growth habits in order to judge proper grazing use of the desirable plants. For more information on range management, contact the local office of the U.S. Department of Agriculture's Soil Conservation Service.

March 1987